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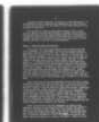
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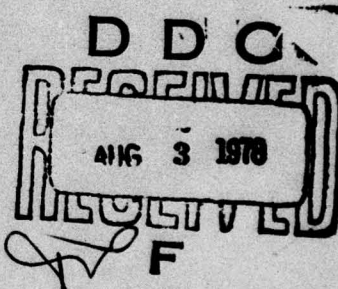
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# **MARINE CORPS AND NAVY MANPOWER: Requirements and Considerations**

**H. Wallace Sinaiko  
Smithsonian Institution**

**V. Robert Hayles  
Office of Naval Research**



June 1978



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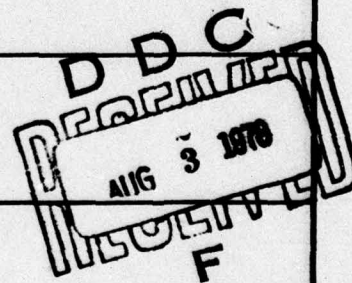
**Manpower Research and Advisory Services**

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<p>During March 5-7, 1978, the Office of Naval Research sponsored a conference on Marine Corps and Navy manpower. The meeting came about because known demographic trends point to coming problems for the Services in recruiting enough qualified young men. The purpose of the conference was to consider possible research contributions to the problem and to identify candidate areas for new R&amp;D support. Four panels dealt with these topics: (a) physical and mental standards for enlistment; (b) civilianization and direct procurement; (c)</p>																	





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underutilized groups, e.g., women and minorities; (d) organizational factors. About 40 people attended the meeting; they included scientists, research managers, and manpower policy and planning people. In addition to providing a forum for discussing manning issues, the conference generated statements of research needs and specific recommendations for addressing them.

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Requirements and Considerations.

Report of a conference  
held at  
Leesburg, Virginia

on March 5-7, 1978.

9 Technical rept.

10 H. Wallace / Sinaiko V. Robert / Hayles

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The conference reported here was organized by a subcommittee of the Office of Naval Research Manpower R&D Planning Committee. Members of the subcommittee, whose efforts are gratefully acknowledged, were: Dr. Douglas J. DePriest, Office of Naval Research; Mr. Edward A. Dover, Headquarters Marine Corps; LtCol William H. Osgood, Headquarters Marine Corps; LCDR Joyce E. Kilmer, Bureau of Naval Personnel; and Mr. Robert K. Lehto, Bureau of Naval Personnel. Robert Hayles served as chairman of the subcommittee.

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H. Wallace Sinaiko

V. Robert Hayles



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## BACKGROUND

Since late in 1971 the Office of Naval Research has had the responsibility for a program of exploratory development research on naval manpower problems. From its inception the program has been overseen by a committee\* whose membership is drawn from ONR's scientific divisions and from other manpower and personnel agencies of the Navy and Marine Corps.

Early in 1977 the committee named three subcommittees to look in depth into three areas which seemed to be potential candidates for R&D support. Subcommittee chairmen were encouraged to organize seminars that would bring in academic, operational, and other experts to educate the full committee and enable it to discuss, with the seminar speakers, prospects for new research efforts. This report summarizes the outcomes of the seminar on manning strategies.

## THE MEETING

A two day seminar was held during March 5-7, 1978, at the Xerox International Center for Training and Management Development in Leesburg, Virginia. (A list of the 38 attendees is found in the distribution list of this report.) The underlying assumption for the seminar was that, because of national population trends, the Navy can anticipate increasing difficulty in recruiting enough 17-20 year old males. Four panels dealt with ways to ease this coming shortage of new recruits. Each panel included from two to four informal presentations, and ample time was provided for discussion.

### Panel 1. Physical and Mental Standards.

The first speaker, Dr. Martin Wiskoff (Navy Personnel R&D Center), described the mental standards currently used in evaluating applicants for naval service. The SCREEN procedure, which is an updated version of the Odds For Effectiveness technique, provides a probabilistic estimate of the likelihood that an individual will complete the first year of his obligated term of service. Wiskoff said that entry standards have been raised in recent years. He cited a recent publication by COL Forrest Ratliff of the Air Force Human Resources Laboratory which summarizes research on Project 100,000 (of the late 1950's) and lessons learned from that experiment. The current test battery used by the Armed Forces,

\*The Planning Committee for the Program in Manpower R&D



the Armed Services Vocational Aptitude Battery (ASVAB), serves for both screening and classification. There are several forms of ASVAB; one is given to about one million high school students each year, and others are administered at the military enlistment processing sites and at Armed Forces Entrance and Examining (AFEES) stations. According to Wiskoff, much of the data collected in the 13 subtests of the battery is not used by the Navy, although it is available on tapes. He also indicated that there are several problems in current testing practices, including: a) test reliability; b) test security; and c) incomplete personnel assessment. For example, the ASVAB was introduced in January 1976 before adequate norming and validation studies had been done. Wiskoff showed some 1976 data that demonstrated very different distributions of ability depending on whether the Basic Test Battery or the ASVAB were used. He made a strong recommendation for better control of the testing process, and called for increased research into computer adaptive testing. In addition to coping with many existing testing problems, the latter would make possible accurate measurement of the abilities of people throughout the distribution rather than, as at present, only those in the middle range.

Wiskoff pointed out that the Navy recognizes that personnel classification procedure is currently followed in an imprecise manner and that the general process for aiding applicants to make career decisions is not very effective. NPRDC is assisting the Bureau of Naval Personnel and the Recruiting Command in improving this procedure. Wiskoff also said that there are "minority fill" problems; that is, it is difficult to get sufficient numbers of qualified minority candidates into the schools. School quotas, once filled, cannot be expanded. Qualified people who come along later are therefore excluded regardless of their race.

Wiskoff also talked about the approximately 30% of Navy recruits who go into what is known as "general detail." Their initial assignments are as seamen, airmen, or enginemen without technical training beyond boot camp. Wiskoff reported that NPRDC is currently developing new procedures which will match the abilities of general detail people to specific ratings, holding out the possibility that these recruits can be better utilized after they have entered the fleet.

The second speaker was Dr. William Sims (Center for Naval Analyses), who began by citing a report of recruiter malpractice. He pointed out that this malpractice may imply that there are not enough potential recruits to go around.

Minimum enlistment standards differ from one service to another. Some services require only that an applicant exceed a minimum percentile score on the Armed Forces Qualification Test (AFQT), while other services require a combination of AFQT and specific aptitude area scores. Furthermore, test standards differ across the Services for high school graduates and non-graduates.

CNA is looking into attrition by occupational areas. Sims pointed out that the current recruit selection devices used by the Marine Corps are crude and greatly reduce the supply of potential recruits but do tend

to work, at least in predicting recruit attrition and school performance. In discussing how cutting scores are established for various tests, Sims said that they tend to be highly arbitrary in most cases. He went on to assert that selection tests are of unknown validity with respect to job performance. There was considerable discussion of whether adaptive, i.e., computerized, testing would be useful in addressing the criterion problem; that is, would the technique make it possible to predict not only how successfully people will go through training but also how well they will do on the job?

The final speaker on the first panel session was LCDR Gloria Holmes (Bureau of Naval Personnel). She described physical occupational standards and the changes in them that are now being contemplated. A study under way for six months has been dealing with the specific physical standards of Navy occupations. (The other services have been doing similar research.) The Navy is not developing separate standards for women but rather standards based on job requirements. There is also an interest in developing strength and stamina standards for all manner of shipboard assignments. LCDR Holmes mentioned a current study at the Orlando training center having to do with changes in physical strength as a result of training during boot camp. Ultimately, the Navy hopes to determine if it is necessary to incorporate tests of stamina and other physical measures into its entry test batteries. LCDR Holmes pointed out that there is a need for inexpensive and easily administered tests of this type. She also described a long range study which will update occupational ratings data and will include findings about physical demands of Navy jobs. LCDR Holmes said that the Navy is prepared to consider modifying certain jobs to accommodate to people's physical capabilities. In some instances where it was impossible to engineer a job to eliminate heavy lifting, the worker could call on an associate to assist.

#### Panel 2. Substitution

The two speakers in this session approached manpower shortages from a different perspective than the preceding speakers. They weighed the pros and cons of three types of substitution: a) civilians for uniformed personnel in certain Navy billets; b) contract labor; and c) direct procurement of technically qualified Navy people.

The first speaker, LCDR Lee Mairs (Bureau of Naval Personnel), described a case study he had recently completed on prospects for civilianizing a particular Navy rating, i.e., that of the Training Deviceman (TD). (Mairs referred parenthetically to Richard Cooper's recent Rand report and its emphasis on savings potential through hiring people on contract to perform certain training and intermediate maintenance functions. According to Cooper a saving of approximately one billion dollars per year could be realized throughout the Defense Department.) Mairs pointed out that several alternatives were examined with regard to the TD. The job of the TD lends itself to civilianization because it is one of the few Navy ratings in which there are no sea duty assignments. Arguments in favor of keeping TDs in uniform include: a) availability in the event of emergency or in the event that the Navy has to be expanded



very rapidly; b) uniformed people can be made to work 16 hours a day if need be; c) certain legal reasons. Mairs pointed out that TDs tend to be rotated in their jobs; i.e., they are moved from one station to another at about four-year intervals, although there seems to be no valid reason for doing this. According to Mairs, a significant cost saving would be realized if 100 TDs could be replaced by 77 or fewer civilians. Mairs pointed out that the jobs done by TDs are also performed in the airline industry by technicians who maintain and service very large simulators used for flight training. The airlines claim that they use about one-third as many men as the Navy to maintain simulators.

Mairs put forth several arguments favoring the use of contractors rather than civil servants. He said that the opportunity of earn profits attracts good firms and at the same time provides the flexibility for a contractor to dismiss unproductive employees. Mairs also showed some data that demonstrated that when the market for people changes, companies are able to lower or raise wages accordingly. That is, he showed a saw-tooth phenomenon illustrating this among aerospace companies working at Cape Canaveral. As contracts were shifted from one company to another, it was possible to lower managers' wages. Mairs also cited an Air Force study in which, under controlled conditions, one air base was largely civilianized via contract while another, doing comparable work, used in-house civil servants. The former was shown on several measures to be less expensive and more efficient. Mairs also said that civilian contractors tend to do things the cheapest and most expeditious way, and he cited a case of an Air Force simulator component that under civil service or military operation tends to be returned, when defective, to the factory at a cost of about \$2000 per incident; the civilian contractors dealing with the same problem tend to go out to the local Radio Shack and replace a transistor for 39¢.

Mairs said that there were three policy requirements with regard to contracting. First, there is a need to determine how to write better contracts and how to administer them more efficiently. Second, ways have to be developed to make the Navy more willing to pay to enforce its contracts. Third, there is a need to convince contractors that their performance will effect future awards. Mairs suggested that there would be a value from compiling a "lessons learned" document on contracting experiences.

Mairs referred to certain institutional issues—such as the way the budget process works in the Defense Department—in which the Navy seems to eliminate many incentives to cost saving. For example, he said, when budgets are prepared the full costs of military manpower, including retirement, are rarely included. Thus, the comparison of military with contractor potential puts the former in the less favorable light. Mairs said that there was a new study now under way to examine the Navy's Air Traffic Controller rating.

Mairs reported that the direct procurement of technical or experienced personnel for naval service is a virtually non-existent practice, although

at one time there was a great reliance placed on this policy. It was particularly effective in staffing construction battalions and other branches of the Navy requiring a great deal of technical expertise. Mairs said that direct procurement can result in certain leadership problems, namely that people who enter the Navy at an older age haven't acquired the leadership skills developed among people who are brought in as seaman recruits. Another problem in the direct procurement issue is that it is very difficult to convince military people of the acceptability of that approach to manpower.

The second speaker was Dr. Herschel Kanter (Brookings Institution) who spoke about a recently completed study for the Senate Armed Services Committee titled "Shaping the Defense Civilian Work Force." Kanter said that the study emphasizes blue-collar workers and enlisted personnel in the services. Kanter described the study as looking at the mix of military, civilian and contractor workers, emphasizing the possibilities of saving personnel in all three categories. He said that the decision-making process does not now give much attention to the mix.

Kanter noted that the topic of civilian substitution for military personnel—whether by civil servants or contractor employees—is particularly important because of the decreasing population of 18-year-olds available in the next ten years. He discussed the impediments to civilianization and said that it ought to be possible to overcome them. He said there are several hundred thousand positions which appear to be available for civilianization and that these should be carefully examined by some group outside the Services.

Kanter also said there was evidence that the Defense Department uses too many people in base operations and logistics. On the basis of in-house and contractor comparisons used in the Air Force's formal bidding process, contracting-out appears to offer substantial savings in base operations, decreasing both military and civil servants. Kanter discussed the Navy's study of civilianization of support ships, which describes prospects for both dollar savings and decreases in military manpower through the substitution of either the Military Sealift Command (civil service) or the merchant marine (contract) as operator of those ships.

### Panel 3. Underutilized Groups

Speakers in this session addressed the manpower shortage in terms of (1) subsets of the population which have not been adequately exploited vis-a-vis their potential as prospects for naval service; (2) obstacles to the Navy's utilization of people in these under-represented groups; and (3) what we have to know to overcome those obstacles. Dr. Lawrence Johnson (Lawrence Johnson and Associates) introduced the panel by speaking briefly about the history of minority groups in the military.

Dr. Jean-Marie Mayas (Lawrence Johnson and Associates), also spoke briefly, primarily to raise questions that are being addressed by a research effort now in progress in his organization. He said that the research was being done to learn how blacks view the Navy in general and



officer careers specifically. As obstacles to the enlistment of blacks in the Navy, Mayas mentioned the way the Navy recruits its officers, discipline patterns which appear to be discriminatory, social-psychological impediments, cultural issues, and a lack of water experience among blacks.

LCDR Joyce Kilmer (Bureau of Naval Personnel) was the third speaker, and she described the current situation regarding women in the Navy. There are presently about 3,900 women officers, with a projected strength of approximately 4600 by 1983. (Kilmer said that the number might be as high as 5000 if regulations are changed to permit women to go to sea.) There are currently about 19,000 enlisted women, and that number is expected to increase to about 30,000 by 1983 (or 40,000 if sea duty is available). Most women officers are commissioned through OCS, some are commissioned through naval ROTC units, and eventually there will be some from the Naval Academy. All enlisted women are trained at the Orlando Recruit Training Center. Kilmer said that women attend the same class-A schools as do men but that initial service entry standards for women are higher than those for men. The first group of women officers have recently been assigned to the surface warfare school in preparation for possible sea duty on non-combatant ships in the event the Navy's modification to Section 6015 of the U.S. Code is passed by Congress. Eighty-two of the Navy's 102 ratings are open to women, but the majority of Navy women still cluster in administrative, clerical, and medical occupations. A problem that Kilmer sees confronting the Navy is that many supervisors do not know how to manage gender-integrated work groups. She went on to say that women are assigned to "arduous overseas shore duty" in such places as Guam or Adak, Alaska, and that these assignments are considered to be the equivalent of sea duty for women in the personnel rotation system.

LCDR Kilmer said that there are legal restrictions on what Navy women currently are allowed to do. For example, they may not by law serve on any Navy ships except hospital ships and transports, none of which are in the current inventory. This exclusion of women from sea duty in turn diminishes their assignment opportunities ashore. The legal inflexibility also bolsters attitudes which often lead to unnecessary constraints on the use of women. Kilmer pointed out that misperceptions about women's lost time and physical strength continue to affect managers' willingness to creatively employ their female resources. She said also that berthing requirements in certain parts of the world restrict the assignment of women.

In the face of these constraints, Kilmer said, Navy policy makers are aggressively tackling each problem as it arises. They hope that the proposed legislation allowing women to be assigned to specified auxiliaries and research ships, if passed, will also be a wedge to expanded job opportunities in the shore establishment. The expansion of the numbers of women on active duty (now planned through 1983) will, in Kilmer's view, result in integrated work group experiences which can replace the current myths about the capability of Navy women. Kilmer added that the present restrictions on where and how women may serve have a negative impact on Navy women's morale and at the same time

short-change the Navy of a readily available talent pool. According to Kilmer, the Navy is counting on turning this situation into a winning one for both the Navy and Navy women with the 6015 modification and attendant expanded women's role.

Other issues on the utilization of women included these: 1) women officers have equal opportunity or career development problems, while the main problem for enlisted women has to do with their underutilization; 2) the marines have been able to recruit all the high quality women they require, but there is some uncertainty about whether the supply will be sufficient if the quota goes up considerably; 3) we do not know the extent to which women will accept so-called "undesirable" jobs, i.e., as boilertenders and the like.

The next panelist was Dr. William M. King (University of Colorado, Boulder). He began with the observation that while a fair amount is known about military sociology in general, relatively little is known about naval socialization. In this connection, he raised several questions, i.e.: how is naval socialization related to the increasingly technological nature of the Navy? and, are there in the Navy certain built-in biases which militate against the retention of minorities in the naval officer corps? He said that it would be well to examine selection criteria for entrance into the Naval Academy and NROTC programs, especially in light of the differences in scholarship practices in black and white colleges.

Another question raised by King dealt with the point at which a naval officer, officer candidate, or enlisted man loses interest in the military as a career. Why, for instance, would a black officer candidate abandon an NROTC scholarship if it meant leaving college? Closely related is the question of why people go into military service in the first place. For example, if a black officer candidate has received a scholarship for an education that he might not otherwise have been able to afford, this tells us something about his probable willingness to remain in service beyond his initially required obligation.

King and others also commented on ways in which an understanding of custom and tradition might lead to alternative recruiting strategies. Here they dealt first with the "water hypothesis," which refers to the low priority given to water-related activities in the black community even where such activities are available. A second question concerned how a young person develops an interest in attending one of the service academies. King said that interest is a function of knowledge, and he questioned that young minority group members have adequate sources of information about the nature of the "outside world." He further stated that (1) for those who are passive learners--i.e., those who read minimally, for whatever reason--the Navy's television advertising gives a distorted picture of reality; and (2) literature designed for distribution in the black community is discriminatory in tone and intent; e.g., such different messages are directed at black and white readers as, "The Navy: It's a mind-growing experience" vs. "The Navy: It's not just a job, it's an adventure."



King discussed the importance of symbolism in late adolescence. He also proposed a study to determine the expectations that are raised by military service journals and the extent to which those expectations are validated by experience.

King and others talked at length about literacy skills, verbal skills in general, and the special needs of different cultural groups. King expressed the view that reading deficiencies can be corrected only at high cost because of the amount of effort required. He described a remedial technique he had used with some success, noting that its chief weakness was that it required a one-on-one approach.

#### Panel 4. Organizational Considerations.

This session dealt with organizational issues and how they might affect shortages. Dr. David Bowers (University of Michigan) began by questioning the traditional belief that a naval enlistment provides an opportunity to learn new skills for later transfer to civilian life. In fact, according to Bowers, this may not be true at all, and we ought to either retract the claim or make it true. Bowers said that "a sense of community" has been shown to be a unique motivator but that, in his opinion, it is something which the typical navyman seldom experiences. Bowers also questioned the long-held assumption that only those who are exposed to military discipline will be able to respond in a responsible way in time of danger. He pointed out that people in civilian occupations face danger every day and behave in an exemplary way. Bowers referred to what he called the "traditional fantasy" of assuming that the right people are "out there (in the civilian recruit pool) if we can only find them and let them know about us." He felt that this might be partly true, but he didn't think the Navy ought to depend on it for enlistments.

Bowers said that with the many employment options available to them, young men and women don't have to accept jobs in autocratic organizations. As evidence, Bowers cited Institute for Social Research (University of Michigan) surveys of 1972 and 1973 which showed that personal independence as well as material success was seen as important in all age groups; but the youngsters in the sample tended to reject autocratic management beliefs more than older respondents. Bowers warned that in ten years, 50% of the people in the total sample who said that they preferred autocratic management would be retired; in twenty years, all of them would be out of the system. He added that in the civilian world, rotation in and out of onerous job situations is practiced; and he suggested that new, similar schemes could be worked up for the Navy.

Bowers also discussed "military management and underutilized research." He began by reiterating well-known findings from Stauffer's work on the American soldier in World War II and similar research at that time by the German armed forces: that the face-to-face peer group can be effectively managed and rewarded as a group. He said that this fact is sometimes disregarded in favor of a commonly held belief that people should be treated at all times as individuals. Bowers also said

that productivity and satisfaction are higher when there is an "involvement type" of management style, and he backed up his assertion by citing a large accumulation of industrial survey data over many years. There is considerable evidence on the relationship of retention rates to management style; the latter has also been shown to affect aircraft maintenance performance, safety, disciplinary rates, and the like.

Turning to productivity, Bowers said that it is known to increase when work is seen as meaningful by incumbents. He also said that productivity and satisfaction are higher where management style is improved, and he indicated that this does not seem to be a function of whether the individuals concerned are blacks, women, or males. Bowers pointed out that past ISR research showed very few race differences except that blacks tended not to want to accept dirty work—which probably reflects a long history of discrimination. Bowers also referred to recently published research by his colleague Warrington Parker on work groups and their racial composition. Parker showed that blacks' perceptions tend to be determined by their own sense of security and by such factors as whether they work for a black or a white supervisor. Bowers concluded by mentioning several R&D ideas. First he said that there ought to be strong support of the Navy's Human Resources Management programs. Second, he referred to the concept of a "coming advancement crisis," which holds that the baby boom is flooding the market and will make it very hard in the near future for young people to advance in their organizations. Bowers asked whether there were alternatives to advancement and whether new organizational designs could ameliorate this problem. He suggested that mutual accountability might be a better approach than authoritarian management. Finally, he suggested that work be done on methods of organizational intervention.

The next speaker in this panel was Mr. Terence Jackson of the National Center for Productivity and Quality of Working Life. Jackson pointed out that there is no single best management pattern but that an effective management has to be adaptive to future trends and will always be eclectic and broad in its approach. He gave several examples of good management practice, e.g., the IBM Corporation's training in "quality perception." Part of that plan has been to break up the size of working groups into smaller units and to initiate practices which involve workers in major decisions such as purchasing. Jackson also cited Japanese quality control, which he said had been accomplished in the face of a bad reputation for product quality. Workers have been taught how to diagnose faults, how to plot their own performance, and how to call in technical specialists when needed. Jackson said that when complaints arise during warranty periods they are sent directly to the assembly line and to the unit that built the offending product. Turnover in Japanese factories is very low, about 2% a year, and absenteeism rates are also said to be low. According to Jackson, the Japanese tend to use "temporary" workers, many of whom are retirees, as an added source of manpower. The main point made by Jackson was that the Japanese have pushed responsibility to relatively low levels in the work hierarchy. In concluding his remarks, Jackson talked about the experience of the Norwegian ship design and shipbuilding industry, which a few years ago was experiencing serious



manpower problems. Norwegian seamen, comprising about 20% of the nation's adult male workforce, had excessively high rates of turnover and alcoholism and showed other evidences of social disorganization. Subsequently, the Norwegians instituted a "social-technical" approach to ship design, based on the work of the Tavistock Institute in London. The approach first describes the social system of the ship and then has designers and builders work toward accommodating to that system. The Norwegians are also experimenting at the present time with very small all-officer crews. Jackson concluded by saying that there are new manufacturing technologies, such as industrial robots, that offer attractive possibilities for reduced manning—but that designing with an eye to social as well as technological considerations would be the best way to deal with uncertainties about the future manpower supply.

The third speaker, Dr. Jack Drexler of the Battelle Human Affairs Research Center, said that an important place to start was to determine how an organization rewards its people. He cited research showing the importance of the work environment; (work environment is more important than the characteristics of individuals in the work group, for instance). He said that the implication of this for the Navy is that more support should be given to the Human Resources Availability Program (HRAV); i.e., HRAV tends to be pushed to low priority status by competition from other activities. Drexler also pointed out that in organizational development it is important for top management to support changes that are being undertaken, and he raised questions about how to include key operational people during the conduct of research on organizations and in implementing findings. With regard to the remarks of Mairs on civilianization, Drexler added that the learning period for newly hired civilians in a job is a one-time thing—whereas, for military personnel, there are problems of transition and getting up to speed when they are rotated from one job to another. He cited research done at the Rand Corporation on Air Force doctors and the amount of time lost in transfer from one duty station to another. Drexler raised questions about how women will function in what have been traditionally male roles, and he said that very little research has been done in real settings in this regard. He raised questions about how women would be able to oversee or manage predominantly male groups or subordinates, and he questioned sex/role stereotyping by women's subordinates and managers.

#### CANDIDATE ISSUES FOR RESEARCH SUPPORT\*

##### Physical and Mental Standards

Secondary analysis of psychometric data. A great deal of psychometric data is available because the Armed Services Vocational Aptitude Battery (ASVAB) has been widely administered in secondary schools and at Armed Forces Entrance Examining Stations (AFEES). Most of the responses to ASVAB's 13 subtests have not been subject to analysis, although they are available on tapes. One possible analysis would be to determine the validity of these tests, or subsets of their items, in predicting subsequent

\*This section draws heavily from summarizing remarks of Dr. Richard S. Elster, Bureau of Naval Personnel.

performance in the Navy. Of course, criterion measures are critical here and they will have to be developed and refined. The acceptable quality of ASVAB data and their susceptibility to secondary analysis have also to be established.

Adaptive testing applications. This new area has not been pushed beyond basic (6.1) research, although a fair amount is known about its potential for measuring cognitive abilities. Current techniques for testing ability tend to be limited to measuring middle-of-the-range individuals. The potential of an adaptive approach for expanding this range could be determined by exploratory work. Because an adaptive test would be, in a sense, "tailor made" as a function of an examinee's responses to it, it could greatly enhance the sensitivity of the Navy's testing and, ultimately, lead to better classification and utilization of its people. Another promise of adaptive testing is that it can produce time savings over conventional approaches; for example, high aptitude people can be moved into test areas appropriate to their abilities very rapidly rather than forced to go through standard material for which they are overqualified.

Improved utilization of "general detail" people. About 30% of the Navy's recruits go into "general detail" assignments—which effectively limits their chances of moving toward more skilled occupations. Not only does this preclude longer than first-enlistment careers for them, but it may also deprive the Navy of the services of people who, though they do not perform well in conventional tests, are nonetheless competent. Procedures are being developed at NPRDC for matching the abilities of general detail people to specific ratings. (It is important to recognize that not all Navy people need to be upwardly mobile, and it is unlikely that all general detail men and women are dissatisfied with their assignments. It may be the case that dissatisfaction, where it exists, stems from the application of unrealistically high enlistment standards. That is, we may be "over-hiring" by not admitting enough low aptitude people for general detail assignments.)

Attrition and occupational specialty. There is a known relationship here, and work has been under way for some time at the Naval Health Research Center and the Center for Naval Analyses (CNA) in expanding the knowledge base about it. What also needs attention is the development of better standards for placing people in those occupations that are known to have high attrition rates. This recommendation simply calls for continued support and expansion of research on the relation of attrition to occupation because of its potential for manpower saving.

School achievement and subsequent job performance. This is a long-standing issue, and it is reiterated here only to make the point that very little is known about the relationship between Navy and Marine Corps school performance and how well people work out in their specialty areas.

Strength and stamina job standards. There is a need to establish measured physical standards based on dynamic criteria, i.e., on actual physical demands of Navy occupations. Once these are developed, there



will be a need to build and validate tests of physical strength that can be reliably administered at low cost. The extent to which training can increase physical strength also needs to be determined. Information derived from such research can be applied in several ways' e.g., Navy entrance standards might be redefined in accordance with the realities of physical demands, or jobs could be modified. (See section on job design below.)

Economics of entrance standards. While it is generally conceded that high mental and physical standards may deny to the Navy and Marines some people who would be able to serve competently, we do not know whether lowered standards would create new costs. For example, would relaxed physical criteria result in higher injury rates, more health care, and a greater pension burden? Would lower aptitude people impose greater leadership or management burdens?

Moral standards. This is a murky area that needs tighter definition. We do not presently have good indicators of moral quality, nor do we know how those currently in use are related to success in the Navy. Further, there are different moral standards for certain occupations and they should be reviewed and validated. How many candidates for naval enlistment are rejected on moral grounds? What are the reasons for such rejections?

Job design and redesign. In facing anticipated shortages in enlistments from 17-to-20 year old males, the Navy will need to consider substituting other kinds of people, e.g., women and civilians. This recommendation calls for an examination of Navy jobs that are traditionally done by average and above-average young males, with the hope that some jobs or tasks may be redesigned to accommodate to other incumbents' physical or mental characteristics. Research could include the application of human engineering principles to equipment in order to make it compatible with new classes of operators.

#### Substitution of Civilians and Direct Procurement

Cost-analysis of seagoing ratings. Work was reported on cost tradeoffs in substituting civilians for military people in two ratings: Training Deviceman and Air Traffic Controller. But these are obvious candidates for civilianization because they are closely related to civilian occupations. It would be useful to extend the analysis to more typical Navy ratings, e.g., Radioman, Engineman, Fire Control Technician. Will the benefits claimed in the earlier studies hold up? Would combat readiness be adversely affected by the introduction of civilians to certain billets?

Criteria for decisions to civilianize. The rules or standards for determining which Navy jobs can be turned over to civilians, either to contract employees or to civil servants, are inadequate. This recommendation proposes research that would develop quantitatively based criteria for determining which jobs can be civilianized and at what cost savings. The work could also deal with criteria for deciding between civil service and contractor options. It would also be useful to determine the extent

to which the conversion of a job from military to civilian serves to make military people available for combat roles.

Direct procurement. Very little is known about this approach to manning beyond the fact that the practice was widely followed in wartime and was apparently successful. Research here would be directed toward answering these questions: What Navy billets lend themselves to direct procurement? What is the magnitude of the supply of candidates for those jobs? How would training have to be modified, and at what cost, if older, technically skilled people were recruited? Can direct procurement be made to serve the reserve force as well as active duty units?

Management of civilians. If some traditionally military jobs become civilianized, will new management problems arise? To what extent will military commanders have to learn new leadership styles to deal with civilian subordinates? What are the implications for the reverse situation, i.e., one in which civilians manage military personnel? (There is a small and growing body of knowledge in this area that should be expanded —e.g., the Navy Personnel R&D Center's current work on senior civilians in the Department of the Navy.)

Can research develop intervention techniques aimed at bringing about a smooth transition from traditional to new mixes of people? These will be especially needed where supervisors resist changing traditional ways of managing formerly all-military units.

Other human-resources problems anticipated for mixed groups include:  
1) the question of discipline: are there legal issues in this regard?  
2) what would be the unique aspects of such psychological problems as motivation, control, and group identity?

#### Technology and Its Manpower Impacts

Mechanisms for forecasting the effects of new systems on manning are needed. This problem is at the heart of the Navy's HARDMAN program, and its solution is central to better manpower forecasting.

Substitution of capital for labor, or using technology to relieve manning pressures, is a possibility. More specifically, we recommend the investigation of automated approaches that would make possible much smaller crews on ships and in shore stations.

New ship designs based on organizational factors. A "sociotechnical" approach, in which ship design flows from crew characteristics, is being tried experimentally in Norway. The Navy should track those experiments with the objective of reducing crew sizes and dependence on technical skill.

#### Underutilized Groups

Minority groups and naval service. Very little is known about the perceptions of the Navy by minority civilians. Information about such perceptions is essential if recruiting among minorities is to be effective. Related problems include a need for better understanding of what



minority group members see as obstacles to enlistment. Because the proportion of minority officers is so low, there is a particular need to investigate their perceptions of their careers. We also need to know much more about how to communicate effectively with minority group members about naval service. What is the potential for enlisting more minority recruits?

The socialization of members of minority groups, i.e., how they become part of Navy life and become accepted in informal groups, is an important and neglected aspect of minority affairs. A particular kind of socialization takes place in ROTC units, the Naval Academy, and OCS, and it should be examined in depth. Methodologies for doing this could include historical research, the content analysis of military publications, direct observation, and interviewing. One focal point of socialization research could be the successful minority officer or petty officer: What are the conditions—personal and situational, for example—that contribute to successful adjustment?

Women in the Navy. There are many unanswered questions in this area. Anticipating many more women in naval service, we need to know how to integrate them into traditionally male ratings and positions of leadership. We know of very little research, for example, on the supervision of military women by men, or the reverse—two circumstances that are certain to become commonplace. Although applications from women to serve in the Navy have always far exceeded the number of available billets, this is likely to change with the raising of quotas for women. When that happens will there be a continued high level of interest in naval service? If current legal barriers to service at sea are dropped, will women seek enlistment in greater or fewer numbers? Will women accept being classified into "undesirable" or physically arduous ratings, e.g., as enginemen?

It has been alleged that underutilization of women (and minorities) has resulted in bad morale, lowered satisfaction with the Navy, and disinterest in long term careers. This needs to be documented. Women officers, in particular, are said to suffer because of a denial of certain assignments on grounds of their sex; this, too, needs verification—and, if true, correction.

Assuming that assignments to ships will be opened to women, there are many problems of integration into the seagoing work force. One approach would be to learn from the experiences of the Coast Guard, NOAA, the Merchant Marine, and recent experiments in Army combat units.

The process by which new naval enlistees become effective leaders and move into positions of responsibility is known to be slow. Research dealing with ways to speed up and, in general, enhance that process for minorities and women would be especially useful.

#### Organizational Considerations

There is uncertainty about the transferability of skills learned in the Navy to civilian occupations. Since the opportunity to learn a marketable trade has long been held out as a recruiting promise, the

reality of the promise should be verified; if there is less transfer than has been claimed, there should be research aimed at ways to increase prospects for transfer.

The Navy should develop ways to exploit the peer group as a unit to be managed and rewarded (or punished) for its performance.

Continued tracking of changing social values is necessary if the Navy is to manage its recruits effectively. Changes have been documented for the population in general, and there are implications—of such changes as increased rejection of autocratic leadership, for example—that need to be recognized and accommodated.

The extent to which technology leads to changed values is an unknown and important issue. For example, some Navy jobs—e.g., those in nuclear power—are so demanding that they require very long lead-time training. In order to keep such people, the Navy has resorted to high retention bonuses. Do such payments change the recipients' perceptions of service? e.g., do large bonuses encourage nuclear technicians to see their work as an occupation rather than a profession?

Because of the "advancement crisis" predicted by Bowers et al., the Navy should plan alternatives to the "up or out" policy.

Certain American and Japanese industrial organizations are said to have achieved greatly improved quality control by shifting responsibility for product quality to lower levels, i.e., to production units themselves. The Navy should determine whether this approach is applicable to Navy work settings.

Time is lost when military people are rotated to new duty stations. Some loss is inevitable due to processing, travel, etc., but research might lead to a reduction in the transition time needed to get up to speed in a new job.

We need to know more about how to supervise and how to teach officers and petty officers to be good supervisors. New leadership training programs in the Navy and Marine Corps are based on a voluminous literature of leadership research. The research needed here is to measure the effectiveness of the new programs.

#### Miscellaneous Research Prospects

Two things came up at the seminar which, though not easily categorized, are nevertheless worth listing:

Research utilization. Manpower research, like most research, is often slow to "catch on." A multi-method approach is recommended; e.g., participant observers, experimentation, and the involvement of managers can be used to increase the probability that research will find its way to the operating Navy.



A manpower model to end them all. We may be approaching the time when it is possible to build an integrative model which takes into account most of the pertinent issues—illustrated in some of the preceding sections—needed for planning and utilization of manpower. This is not a new idea any more than was the quest for the Holy Grail in the 12th Century, but prospects certainly become brighter as we learn more about the separate things that affect our people.

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